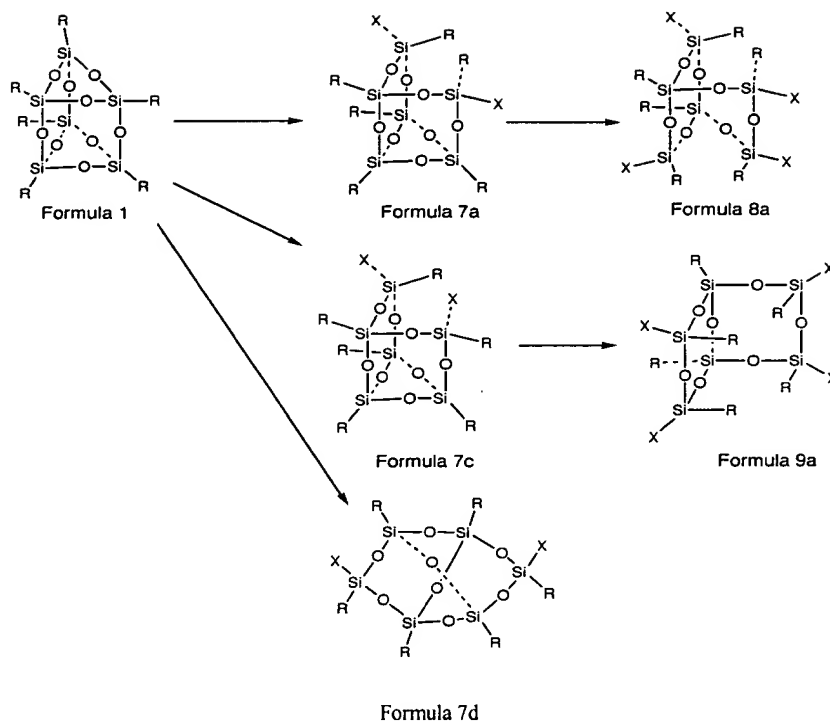


5. A method for selectively opening the rings in POSS compounds to form functionalized POSS derivatives comprising, reacting $[(\text{RSiO}_{1.5})_n]_{\Sigma\#}$, $[(\text{RSiO}_{1.5})_n(\text{R}^3\text{SiO}_{1.5})_m]_{\Sigma\#}$ or $[(\text{RSiO}_{1.5})_n(\text{R}^1\text{R}^2\text{SiO}_{1.0})_m]_{\Sigma\#}$ with a strong acid to form said derivatives, having a conjugate base X, which base is F, OH, SH, NHR, NR₂, ClO₄, SO₃CH₃, SO₃CF₃, SO₃OH, SO₃Cl, SO₃CH₃, NO₃, PO₄ or Cl, where n is 6-12, m is 1-10, where R¹, R² and R³ are different substituents than R which are all selected from the group consisting of aliphatic, aromatic, olefinic, alkoxy, siloxy and H and where # is the sum of the lettered substituents in said POSS compound.

10. The method of claim 5 wherein $[(\text{RSiO}_{1.5})_n(\text{R}^3\text{SiO}_{1.5})_m]_{\Sigma\#}$ is reacted with said acid to form $[(\text{RSiO}_{1.5})_6(\text{R}^3\text{XSiO}_{1.0})_1(\text{RXSiO}_{1.0})_1]_{\Sigma 8}$, where R³ is of the same group as R but is a different substituent and # is m + n.

11. The method of claim 5 wherein $[(\text{RSiO}_{1.5})_7(\text{R}^3\text{SiO}_{1.5})_1]_{\Sigma 8}$ is reacted with said acid to form $[(\text{RSiO}_{1.5})_4(\text{RXSiO}_{1.0})_3]_{\Sigma 7}$ and a by-product containing R³ wherein R³ is of the same group as R but is a different substituent.

12. The method of claim 3 wherein the compound of formula 1 is reacted with said acid to form a compound selected from the formulas 7a, 8a, 7c, 9a or 7d as follows:



18. A polyhedral oligomeric silsesquioxane (POSS) compound of the formula,

C3

$[(\text{RSiO}_{1.5})_n (\text{RXSiO}_{1.0})_m]_{\Sigma\#}$, where n is 4-24, m is 1-10, R is aliphatic, aromatic, olefinic, alkoxy, siloxy or H and X is the conjugate base of an acid, which base is of F, OH, when the OH groups are in an exo-stereochemical position, SH, NHR or NR_2 , ClO_4 , SO_3OH , SO_3CF_3 , SO_3Cl , SO_3CH_3 , NO_3 , or PO_4 .

20. A method for expanding rings in polyhedral oligomeric silsesquioxane (POSS) compounds

C4

comprising, reacting $[(\text{RSiO}_{1.5})_n (\text{R}(\text{HO})\text{SiO}_{1.0})_m]_{\Sigma\#}$ with $\text{Y}_2\text{SiR}^1\text{R}^2$ silane reagents to obtain at least one expanded POSS ring in $[(\text{RSiO}_{1.5})_{n+m} (\text{R}^1\text{R}^2\text{SiO}_{1.0})_j]_{\Sigma\#}$, where R, R^1 and R^2 are aliphatic, aromatic, olefinic, alkoxy, siloxy or H, Y is halide or amine, n is 4 – 24, m is 1 - 10 and j is 1-10 and # is the sum of the lettered substituents in said respective POSS compounds.

C5

26. The composition of claim 25 selected from the group consisting of one of:

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